

REMARKS

Prior to entry of this paper, Claims 26-51 were pending. Claims 26-34, 40, and 42-51 were rejected. Claims 35-39 and 41 were identified as being allowable if rewritten in independent form. In this paper, new Claims 52-56 are added. Claims 26-56 are currently pending. No new matter is added by way of this amendment. For at least the following reasons, Applicants respectfully submit that each of the presently pending claims is in condition for allowance.

Claims 26, 40, 43, 45-48, 50, and 51

Claims 26, 40, 43, 45-48, 50, and 51 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wang et al. (U.S. Patent No. 6,535,156, hereinafter Wang) in view of Lee et al. (U.S. Patent No. 6,791,484, hereinafter Lee). Each of these rejections is respectfully traversed.

First, Claim 26 is respectfully submitted to be allowable at least because the proposed combination of Wang and Lee does not meet all of the limitations of Applicant's Claim 26.

In this proposed combination, coarse offset calibration circuit 304 of Lee is not a “coarse channel calibration circuit.” Because “coarse channel” has antecedent basis in the claim, a circuit can only be a “coarse channel calibration circuit” as recited if it calibrates the cited “coarse channel”. In the proposed combination, coarse offset calibration circuit 304 (of FIG. 3 of Lee) does not calibrate the coarse channel (coarse ADC 203 of FIG. 2 of Wang). Rather, coarse offset calibration circuit 304 (of FIG. 3 of Lee) provides coarse offset calibration for the analog input signal of the ADC.

Lee describes a method and apparatus for system offset calibration for an overranging ADC. In Lee, an offset may be present in the input signal IN at node N330, or may be caused by the PGA 314. This offset relative to the capture range of the input to the overranging ADC 306 of Lee can cause problems. As shown in FIG. 1 of Lee, if the input signal A_IN to the overranging ADC is negatively offset relative to the capture range of the overranging ADC, codes are lost for a “deadzone” portion of the transfer curve. As shown in FIG. 2 of Lee, if the input signal A_IN to the overranging ADC is positively offset relative to the capture range of the overranging ADC, the output of the ADC is clamped. The circuit of Lee provides coarse offset correction so that the input

range of signal A_IN to the overranging ADC matches the capture range of the overranging ADC. The coarse offset correction of Lee is not for errors in the overranging ADC itself, but for offset of the input signal range of the ADC relative to the capture range of the ADC.

Accordingly, in the proposed combination of Lee and Wang, coarse offset calibration circuit 304 of Lee does not provide calibration of the coarse channel of the folding ADC of Wang. Rather, in the proposed combination, coarse calibration circuit 304 of Lee adjusts the offset of the signal input to the folding ADC relative to the input capture range of the folding ADC. Accordingly, the proposed combination does not meet the limitation, “coarse **channel** calibration circuit” (emphasis added).

Second, Claim 26 is respectfully submitted to be allowable at least because there is no motivation to modify Wang in the manner suggested.

The Office Action stated that it would be obvious to incorporate “the coarse calibration of Lee et al. into the coarse channel of Wang et al. for the purpose of providing offset of input signal and adjust signal gain such that the full dynamic range of system is utilized (Lee et al., Col. 3 lines 14-28).” However, this is not a motivation to modify Wang. Adjusting the signal gain is done in Lee because the signal is being applied to an overranging ADC. However, the circuit of Wang is not an overranging ADC. Accordingly, there is no need to modify Wang in order to assure that the full dynamic range of Wang is utilized. Since Wang is not overranging, the full dynamic range of Wang is already utilized.

Claims 40 and 51 are respectfully submitted to be allowable at least for reasons analogous to those stated above with regard to Claim 26. Additionally, Claim 40 is respectfully submitted to be allowable because the proposed combination of Wang and Lee does not meet the limitation, “a coarse channel calibration circuit that is configured to: receive an output signal from a coarse channel circuit of a folding analog-to-digital converter circuit”, as recited in Applicant’s Claim 40. In the proposed combination, the coarse offset calibration circuit 304 of Lee receives an output signal from the digital output (the output of mapping unit 105) of circuit 100 of Wang. Coarse offset calibration circuit 304 of Lee of the proposed combination does not receive an output signal from the coarse channel circuit 203 of Wang.

Additionally, Claim 40 is respectfully submitted to be allowable at least because the proposed modification of Wang and Lee does meet the limitation, “adjust a parameter of the coarse channel circuit in response to the output signal”, as recited in Applicant’s Claim 40. In the proposed combination, coarse offset calibration circuit 304 of Lee modifies the input signal, not a parameter of the coarse channel circuit 203 of Wang.

Claim 43 is respectfully submitted to be allowable for reasons analogous to those stated above with regard to Claims 26 and 40. Additionally, Claim 43 is respectfully submitted to be allowable at least because the proposed combination of Wang and Lee does not meet the limitation, “adjusting a parameter of the coarse channel circuit until an output of the coarse channel circuit is calibrated in relation to the reference voltage”, as recited in Applicant’s Claim 43. First, coarse offset calibration circuit 304 of Lee does not adjust a parameter of coarse channel circuit 203 of Wang. Second, coarse offset calibration circuit 304 does not calibrate coarse channel circuit 203 of Wang. Third, the proposed combination only calibrates the resistor ladder, not the output of the coarse channel. **Accordingly, the proposed combination does not meet the limitation, “until an output of the coarse channel circuit is calibrated in relation to the reference voltage”.** For at least these reasons, Claim 43 is respectfully submitted to be in condition for allowance.

Claim 45 is respectfully submitted to be allowable for reasons analogous to those stated above with regard to Claim 43.

Claims 46-48 are submitted to be allowable at least because they depend from Claim 26. Additionally, Claim 48 is respectfully submitted to be allowable at least because the proposed combination does not meet the limitation, “wherein the coarse channel circuit includes an amplifier array”. The Office Action states, “Wang (Fig. 1) further discloses the coarse channel circuit (203) includes an amplifier array).” However, in Fig. 1 Wang discloses that the coarse channel circuit has comparators 107-110, not amplifiers.

Claim 50 is respectfully submitted to be allowable at least because it depends from Claim 40.

Claims 27-34, 42, 44, and 49

Claims 27-34, 42, 44, and 49 were rejected under 35 U.S.C. §103(a) as being unpatentable over Wang and Lee in further view of Chen et al. (U.S. Patent No. 6,628,216, hereinafter Chen).

Claims 27-34 are respectfully submitted to be allowable at least because they each depend on Claim 26, which is proposed to be allowable. Claim 42 is respectfully submitted to be allowable at least because it depends on Claim 40, which is proposed to be allowable. Claims 44 and 49 are respectfully submitted to be allowable at least because they depend on Claim 43, which is proposed to be allowable.

Additionally, Claim 29 is respectfully submitted to be allowable at least because the proposed combination does not meet the limitation, “wherein the coarse channel circuit comprises an amplifier array and a comparator array, and wherein at least one of the amplifier array or the comparator array is configured to receive an adjustment signal”, as recited in Applicant’s Claim 29. Coarse ADC 203 of Wang includes comparators, but the comparators in coarse ADC 203 do not receive the adjustment signal. In the proposed combination, the amplifier and comparator array are not in the coarse channel itself. In the proposed combination, an adjustment signal is not provided to an amplifier or a comparator array in the coarse channel itself.

Additionally, Claim 31 is respectfully submitted to be allowable at least because the proposed combination does not meet the limitation, “wherein the coarse channel calibration circuit includes: a counter circuit that is coupled to the coarse channel circuit”, as recited in Applicant’s Claim 31. In the proposed combination, there would be coarse offset calibration circuit 304 (of FIG. 3 of LEE) to provide coarse offset calibration for the overranging ADC, and there would be a calibration circuit (for a resistor ladder) provided by the circuitry of FIG. 8 of Chen. These would be separate circuits. Therefore, the coarse offset calibration circuit 304 of Lee would not include a counter circuit, because the counter circuit would be included in a completely different circuit. Nor does the coarse offset calibration circuit 304 of Lee include an amplifier array. If the Office Action is proposing that the circuitry of FIG. 8 of Chen would be used to replace the coarse offset calibration circuit 304 (of FIG. 3 of Lee), this would not operate correctly, because these two circuits have completely different functions.

Claim 34 is also respectfully submitted to be allowable at least because neither Wang nor Lee nor Chen, singly or in combination, teach the limitation, “the parameter comprises one of a single-ended current or differential current” (as recited in Applicant’s Claim 34) in combination with the limitation, “adjust a parameter of the coarse channel circuit in response to the count signal” (as recited in Applicant’s Claim 33, from which Claim 34 depends). The Office Action states that Chen “further discloses wherein the parameter comprises one single-ended current or differential current (Chen et al., Col. 26 lines 10-13)”. However, Col. 26, lines 10-13, of Chen states, “the resistance of and current through the resistor tree of the calibration resistors remains the same before and after each adjustment by the control logic”. **Accordingly, in Chen, the current through the resistor tree is not adjusted by the control logic.** The Office Action suggests that the current through the resistor tree is the parameter. However, Chen specifically discloses that the current through the resistor tree is **not** adjusted. For at least this reason, Claim 34 is respectfully submitted to be allowable.

Claims 52-56

Claims 52-56 are respectfully submitted to be allowable at least because they depend on Claim 51, which is proposed to be allowable.

CONCLUSION

It is respectfully submitted that each of the presently pending claims (Claims 26-56) are in condition for allowance and notification to that effect is requested. Examiner is invited to contact the Applicants' representative at the below-listed telephone number if it is believed that the prosecution of this application may be assisted thereby. Although only certain arguments regarding patentability are set forth herein, there may be other arguments and reasons why the claimed invention is patentable. Applicant reserves the right to raise these arguments in the future.

Dated: February 13, 2006

Respectfully submitted,

By

Matthew M. Gaffney

Registration No.: 46,717

DARBY & DARBY P.C.

P.O. Box 5257

New York, New York 10150-5257

(206) 262-8900

(212) 527-7701 (Fax)

Attorneys/Agents For Applicant